GEOGRAPHICAL VARIATION IN ABRASION.

BY JOSEPH GRINNELL.

A STUDY of pertinent material has led me to formulate the following generalizations: (1) That fading of plumage colors proceeds more rapidly in direct sunlight than in the less intense reflected or interrupted light; in other words, that color changes due to fading are far greater in birds of a region of much average daily sunshine, than in one with an extreme proportion of cloudy weather. (2) That abrasion of feathers progresses more rapidly in a dry atmosphere than in a humid atmosphere; for extreme dryness seems to make the finer structures of the feather more brittle. Abrasion in general is from two causes: the attrition of feathers, one against another; and the wear produced by contact with foreign objects. Proposition number two apparently holds good in both cases.

To illustrate, a series of *Cyanocitta stelleri* from the cloudy, humid Sitkan District taken in June and July show but slight traces of wear; while specimens of *Cyanocitta stelleri frontalis* from the arid Sierra Madre Mountains of Southern California taken at the same season are so ragged and faded as to almost completely destroy the fresh fall coloration. Several parallel cases present the same relative conditions; examples at hand from the same two regions are *Junco*, *Empidonax*, *Regulus*, *Certhia*, *Dryobates*, *Melospiza*, and *Hylocichla*.

I am well aware that in the case of birds which live in dense vegetation the nature of the foliage with which they come in contact has much to do with the rate of abrasion, for I have at hand two lots of Song Sparrows taken within three days of each other in June, one from a tule swamp, and the other from a saw-grass swale. The birds from the tules are but moderately worn, while the others are so much abraded on the breast, sides, wings, and tail, as to have lost much of their distinctive coloration. But differences in vegetation, if any exist to such a degree, do not seem to me accountable in the cases cited above; surely not with the Thrushes, Jays and in particular the Flycatchers.

At any rate, however variation in wear is brought about, its

bearing upon the study of subspecies should not be underrated, since differences due to such a factor may be found correlated with different areas in the habitat of a species. The disposition now is to grasp at any perceptible character common to a series of specimens from one locality and to use it to distinguish a 'new' subspecies. I believe the discrimination of even the slightest differences to be of importance. But I would urge that a character which is purely adventitious and due to external causes cannot serve to characterize a *subspecies*; for I believe that a subspecies is an incipient species, and that only what we can judge to be incipient species should be called subspecies. Direct mutilations from external sources must not be confused with innate manifestations, developed from individual variations by natural selection and perpetuated through inheritance. The latter constitute subspecies and species.

I have suggested that variation in abrasion may exist, and that such variation should be discriminated against by those who seek minute color characters. But I do not believe there has so far been much error on that score. Fortunately, color characters are usually accompanied by differences in extent of markings, proportions of measurements, etc. It might be advisable, however, hereafter to use as types of detailed color descriptions, especially in the case of geographical races, specimens having newly-acquired plumages. Colorations at other stages of feather wear might then be intelligibly explained in comparison.

I wish to call attention to one case to which the above remarks seem to apply. A subspecies of the Russet-backed Thrush has been distinguished (*Hylocichla ustulata œdica*), the habitat of which is given as "California, excepting the northern coast; north in the interior to southern Oregon"; etc. The habitat of *Hylocichla ustulata ustulata* is thus restricted to the "Northwest Coast region." I have before me 32 specimens of the Russet-backed Thrush from the Pacific Coast, all collected by myself, as follows: Pasadena (10), Pacific Grove (2), Palo Alto (11), Seattle (1), Sitka (8). These represent habitats of the two alleged subspecies, as defined, by 23 specimens, and 9 specimens, respectively. Turning to the original description of *œdica* (Auk, XVI, Jan. 1899, pp. 23–25), we find it characterized as being similar to *ustulata*,

but with flanks and upper parts paler and less rufescent. It is further explained to be "usually paler than *ustulata*, and has very much less of rufous tinge to the upper surface, including both wings and tail; the sides and flanks are more grayish; the buff of jugulum somewhat paler. Although most of these characters are not entirely constant, typical specimens may be without difficulty discriminated" (!). There is admittedly "no material difference in size"; so here we have to do with color differences only.

In carefully examining my series, as above enumerated, I find that the darkest Sitkan example (No. 1188, June 26) is slightly more rufescent than any from California, while another example from Sitka (No. 1119, June 11) is paler and more olivaceous than any California specimen taken before June 1. The rest of the Sitkan skins (June and July) are all easily matched by as many of the breeding birds taken at Palo Alto in May. The most olivaceous skins I have are Nos. 4748 (June 22) and 4794 (July 10), taken at Pacific Grove, and No. 4277 (June 1), taken at Palo Alto. These are much paler than any from Sitka (except No. 1119), and are correspondingly far more worn. If the Sitkan series is representative of the "Northwest Coast region," I fail to see that they are any darker than California breeding birds at the same stage of abrasion. The greater rate of fading to which California birds seem to be subject, must also come into play, causing a generally paler effect in a large series of summer birds from California. At any rate, judging from my own material I see no evidence of a race '*ædica*.'

Hylocichla ustulata ustulata of the Pacific Coast, *H. u. almæ* from the Great Basin and Rockies northward, and *H. u. swainsoni* of the Eastern province, each possesses distinguishing color characters. Each occupies a separate region in summer, and each seems to follow a separate north-and-south migration route. The conditions governing *H. ustulata*, and *H. aonalaschkæ* (of many recognizable races) seem to consist in a different extent of migration. The former has a long migration route, sweeping south into Mexico early in the fall, and back again late in the spring. The *H. aonalaschkæ* group have a much shorter migration route, some of the races not going south of the United States; and in winter occupying areas nearly as circumscribed as in summer. The less

migratory a species is, the more 'plastic' it seems to be; that is, the more opportunity there is for the peculiarities of faunal areas to become operative factors in evolution.

A LIST OF THE LAND BIRDS OF SEATTLE, WASHINGTON, AND VICINITY.

BY SAMUEL F. RATHBUN.

THE topography of Seattle and the surrounding country is peculiar in many respects, and beyond doubt exerts more or less influence on the birds of the region, particularly in causing many of them to be to a great degree locally restricted.

The city, situated on the shore of Puget Sound, is built on a series of irregular benches, generally trending north and south, which attain a maximum altitude, as shown by the Government survey, of 250 feet above tide water. It is bounded on the east by Lake Washington, a body of fresh water some twenty-four miles in length with an average width of two miles; from this lake eastward the lower foothills of the Cascade Mountains begin. North of and within the city limits are two small fresh water lakes, surrounded by country of a similar character, which continues indefinitely northward. South of the city is a broad expanse of tide flats, lying at the mouth of the Duwamish River, which are now being rapidly reclaimed; a beautiful, fertile and cultivated valley extends up this river for many miles.

Originally the rougher country was clothed with a heavy growth of evergreen timber, principally firs of various kinds interspersed with cedar; many of the former attained a height of 200 to 300 feet. In the bottoms and wetter portions the western maple, elm and alder, with a heavy undergrowth intertwined with vines, throve luxuriantly, in many places presenting an almost tropical exuberance. As the country has become settled this growth has been cleared away. The change has necessarily influenced the habits of